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THE PROMINENCE OF THE EYEBALL AND A METHOD FOR MEASURING IT.[1]

By Edward Jackson, M.D.,
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The need of a simple practical method for measuring the prominence of the eyeball has doubtless been felt by many observers. The difficulties of estimating accurately the degree of exophthalmos, or enophthalmos, from Graves' disease, tumors, inflammatory swelling, and injuries to the orbit, or high myopia or hyperopia, have usually prevented an exactness in the reports of such cases that would be quite desirable. The lack of exact measurements also causes uncertainty regarding the progress of any given case.

Certain measurements of the orbit have been carefully made in the laboratory, and in the pursuit of various lines of scientific investigation. An elaborate instrument for measuring the prominence of the eye, suitable for laboratory studies, has been devised by Birch-Hirschfeld;[2] but we have had no fairly accurate and readily applicable method of determining the prominence of the eyeball suited to general clinical use. To meet this want I have worked out the following plan, which has for over three years served me in a very satisfactory manner.

The point best suited for a reference point, in this connection, is the point in which a plane, passed through the visual axes of the eyes when these are in the primary position, intersects the outer margin of the orbit. This point is very nearly the most retreating portion of the outer margin of the orbit, and is easily determined with sufficient accuracy upon the normal face or upon the denuded bone. Hence it serves as a common point of reference for measurements made upon the living head and those upon the bare skull. Many measurements have shown that this part of the orbital margin has the least variable relation to the apex of the orbit, and to the more important landmarks of the skull. This point has a comparatively thin covering, which varies in thickness but little in different persons and in different conditions of embonpoint. The line joining these corresponding points of the two orbital margins constitutes a base line from which the prominence of the eyeball is to be measured.

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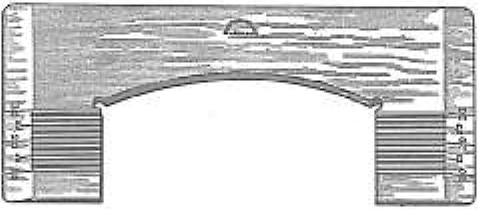
[1] Read before the College of Physicians of Philadelphia, June, 1902.

[2] Klinische Monatsblätter für Augenheilkunde, November, 1900.

To measure such prominence the rule shown in the illustration is employed. The curved side of the rule is pressed against the face, the straight edges resting on the outer margins of the orbits, so that the upper surface of the rule (the one shown in the figure) shall be just in the plane of the visual axes, the eyes being directed horizontally toward the distant object and the head held erect.

There are parallel lines on the upper surface of the rule. The observer places his eye to the right or left of the patient, according as he wishes to determine the prominence of the right or left eye. He then sights along the parallel lines and notices between which of these lines the most prominent part of the cornea appears to fall. The lines are ruled 1 mm. apart, and serve to indicate within 0.5 mm. the protrusion of the cornea beyond the line of reference—a degree of accuracy sufficient for all practical purposes.



Such an instrument, for measuring the forward projection of the eyeball, may be called a *protometer*. This name, suggested by my friend Dr. T. B. Schneideman, has an obvious relation to proptosis, which has come to be used chiefly in connection with the eye.

In making such measurements care should be taken to have the eyes turned pretty directly forward. A little deviation to the right or left will make but little difference in the result obtained; but a decided departure from the median direction will cause the eye to appear less prominent, because the centre of rotation is posterior to the centre of the anteroposterior axis of the eyeball, and because the diameter of the eyeball passing through the sclerocorneal junction is shorter than the anteroposterior diameter.

To provide for different widths of the face I have used two of these scales in question, one 96 mm. and the other 86 mm. in width between the two parts of the straight edge to be pressed against the orbital margin. For very young children a still narrower one might be used; but for the great majority of adults a gap of 90 mm. in the straight edge is sufficient and answers the purpose. A rule of this kind can be quickly made from a piece of thin wood or cardboard. It has been neatly constructed of wood by Bonschur & Holmes, of Philadelphia.

In the great mass of cases the distance of the summit of the cornea in front of the reference line is between 12 and 20 mm., averaging about 16.5 mm. Often there is a difference of 0.5 mm. in the prominence of the two normal eyes. But rarely the difference amounts to 1 mm. unless due to disease, as excessive myopia of the more prominent eye, or orbital changes causing exophthalmos or enophthalmos. The averages indicate that the eye becomes a little more prominent up to the age of sixteen or eighteen years, and that there is a very little sinking in old age; but these changes, and those produced by wasting disease, are probably very much less than might be supposed from casual inspection of the appearance of the orbit. My intention, however, is to discuss these variations of both normal and abnormal eyes at some future time. The present purpose is to put before the profession this simple aid to exact diagnosis.

LOCALIZATION OF FOREIGN BODIES IN THE EYE AND THEIR REMOVAL:

WITH REPORT OF CASES.

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Localization of foreign bodies in and about the orbit has received a great impetus since the advent of X-ray diagnosis.

Formerly, if by any chance a foreign body, such as a piece of steel, iron, lead, shot, glass, porcelain, or coal, had penetrated into the paraocular tissues we were satisfied to know whether it was intra-ocular or extra-ocular, and whether, if it were a bullet, it had penetrated into the cerebral cavity. Occasionally we were able to locate it with the ophthalmoscope before the media had lost their transparency through hemorrhage, traumatic cataract, or inflammatory exudation.

If it could not be seen, one of three things had to be done: first, to thrust a magnet blindly into the vitreous, if there were reasons for believing it to be iron or steel; second, to remove the eye, if the inflammatory reaction were profound, or, if not, third, to allow the eye to remain, with the possible danger of sympathetic ophthalmia or in the hope that the foreign body might not be in the globe at all.